3 b. Cont:

$$\Pi \equiv \left\{ \begin{array}{l} \vec{V_r} = (2,-1,1) \\ \vec{PQ} = (-4,0,1) \\ Q = (0,-1,1) \end{array} \right\} \quad \Pi \equiv \begin{vmatrix} x & y+1 & z-1 \\ 2 & -1 & 1 \\ -4 & 0 & 1 \end{vmatrix} = 0;$$

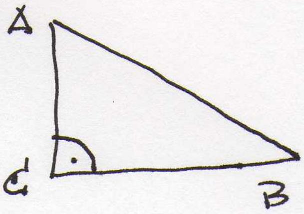
$$\Pi \equiv -x - 4(y+1) - 4(z-1) - 2(y+1) = -x - 4y - 4 - 4z + 4 - 2y - 2 =$$

$$= -x - 6y - 4z - 2 = 0$$

$$\boxed{(x(-1)) : \Pi \equiv x + 6y + 4z + 2 = 0}$$

4.- $A(0,3,-1)$ $B(0,1,5)$

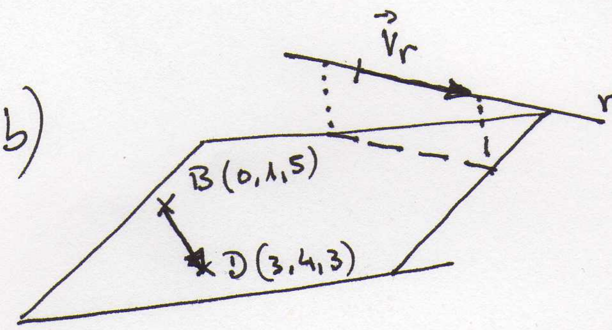
a) $C(x,4,3)$



$$\vec{CA} \perp \vec{CB} \Rightarrow \vec{CA} \cdot \vec{CB} = 0$$

$$\left. \begin{array}{l} \vec{CA} = (-x,-1,-4) \\ \vec{CB} = (-x,-3,2) \end{array} \right\} \quad \begin{array}{l} x^2 + 3 - 8 = 0 \\ x^2 - 5 = 0; \ \boxed{x = \pm\sqrt{5}} \end{array}$$

b)



$$r \equiv \begin{cases} x - y + z = 0 \\ 2x + y = 3 \end{cases}$$

$$\vec{V_r} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & -1 & 1 \\ 2 & 1 & 0 \end{vmatrix} = 2\vec{k} + 2\vec{j} + 2\vec{k} - \vec{i} = (-1,2,4)$$

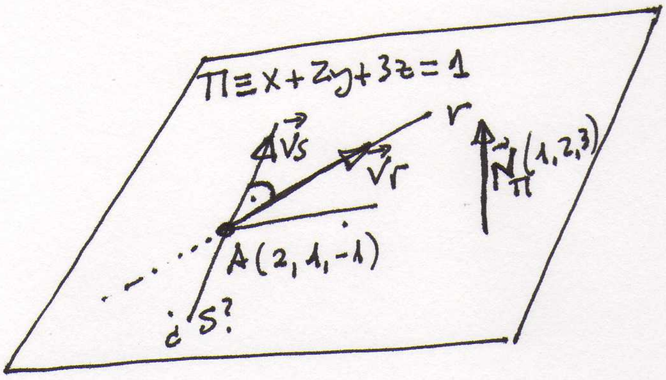
$$\Pi \equiv \left\{ \begin{array}{l} \vec{BD} = (3,3,-2) \\ B = (0,1,5) \\ \vec{V_r} = (-1,2,4) \end{array} \right\} \quad \Pi \equiv \begin{vmatrix} x & y-1 & z-5 \\ 3 & 3 & -2 \\ -1 & 2 & 4 \end{vmatrix} = 0;$$

$$\Pi \equiv 12x + 6(z-5) + 2(y-1) + 3(z-5) + 4x - 12(y-1) =$$

$$= 12x + 6z - 30 + 2y - 2 + 3z - 15 + 4x - 12y + 12 =$$

$$\boxed{\Pi \equiv 16x - 10y + 9z - 35 = 0}$$

5.-



$$r \equiv \begin{cases} x = 2z + 4 \\ y = 2z + 3 \end{cases} \qquad \begin{matrix} x - 2z = 4 & \vec{N}_1(1,0,-2) \\ y - 2z = 3 & \vec{N}_2(0,1,-2) \end{matrix}$$

$$\vec{V}_r = \vec{N}_1 \times \vec{N}_2 = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & -2 \\ 0 & 1 & -2 \end{vmatrix} =$$

$$= \vec{k} + 2\vec{i} + 2\vec{j} = \boxed{(2,2,1) = \vec{V}_r}$$

$$\left.\begin{matrix} \vec{V}_s \perp \vec{N}_\pi \\ \vec{V}_s \perp \vec{V}_r \end{matrix}\right\} \quad \vec{V}_s = \vec{N}_\pi \times \vec{V}_r = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 2 & 3 \\ 2 & 2 & 1 \end{vmatrix} = 2\vec{i} + 6\vec{j} + 2\vec{k} - 4\vec{k} - 6\vec{i} - \vec{j} = -4\vec{i} + 5\vec{j} - 2\vec{k}$$

$$\vec{V}_s = (-4,5,-2)$$

$$\left.\begin{matrix} A(2,1,-1) \\ \vec{V}_s(-4,5,-2) \end{matrix}\right\} \boxed{s \equiv \frac{x-2}{-4} = \frac{y-1}{5} = \frac{z+1}{-2}}$$